

CLAIMS

1. A DC-DC converter comprising:
 - a first switching element connected between one terminal of a voltage source and one terminal of an inductive element;
 - a second switching element connected between the aforementioned terminal of the aforementioned inductive element and reference potential;
 - a third switching element connected between the other terminal of said inductive element and said reference potential;
 - a fourth switching element connected between said other terminal of said inductive element and the output terminal;
 - and a control means which, when said first through fourth switching elements are turned on/off at a prescribed timing, outputs a voltage corresponding to said source voltage to said output terminal, and which turns on said second and third switching elements in the standby mode.
2. The DC-DC converter of Claim 1 in which:
 - said control means has a current detecting means that detects the current through said inductive element and turns on said second and third switching elements corresponding to the detection result of said current detecting means.
3. The DC-DC converter of Claim 2 in which:
 - when the current in said inductive element is nearly zero, said control means turns off said fourth switching element, and turns on said second and third switching elements.
4. The DC-DC converter of Claim 1 in which:
 - said control means enters first, second and third operation states repeatedly;
 - in said first operating state, said first and third switching elements are turned on, and said second and fourth switching elements are turned off;
 - in said second operating state, said first and third switching elements are turned off, and said second and fourth switching elements are turned on;
 - and, in said third operating state, said first and fourth switching element are turned off, and said second and third switching elements are turned on.
5. The DC-DC converter of Claim 1 in which:
 - said control means enters a first, second and third operating states repeatedly;
 - in said first operating state, said first and fourth switching elements are turned on, and said second and third switching elements are turned off;
 - in said second operating state, said first and third switching elements are turned off, and said second and fourth switching elements are turned on;

and, in said third operating state, said first and fourth switching element are turned off, and said second and third switching elements are turned on.

6. The DC-DC converter of Claim 1 in which:

said control means enters first, second and third operating states repeatedly;

in said first operating state, said first and third switching elements are turned on, and said second and fourth switching elements are turned off;

in said second operating state, said first and fourth switching elements are turned on, and said second and third switching elements are turned off;

and, in said third operating state, said first and fourth switching element are turned off, and said second and third switching elements are turned on.

7. The DC-DC converter of Claim 1 in which:

said first, second, third and fourth switching elements are MOS transistors, and a body diode is formed between the source and drain of each of said MOS transistors.

8. The DC-DC converter of Claim 7 in which:

when current in said inductive element is nearly zero, said control means turns on any one of said second and third switching elements.

9. The DC-DC converter of Claim 7, further comprising:

a driver for supplying switch control signal to the gate of each of the MOS transistors that form said first and fourth switching elements, said driver has a diode and a capacitor connected in series between the terminal for power source voltage supply and one terminal of said inductive element; and

a buffer which has a power supply terminal connected to the connection point between said diode and capacitor, a reference voltage terminal connected to one terminal of said inductive element, a input terminal for receiving the control signal from said controller input, and an output terminal supplying said switch control signal to the gate of the MOS transistor of the control object.